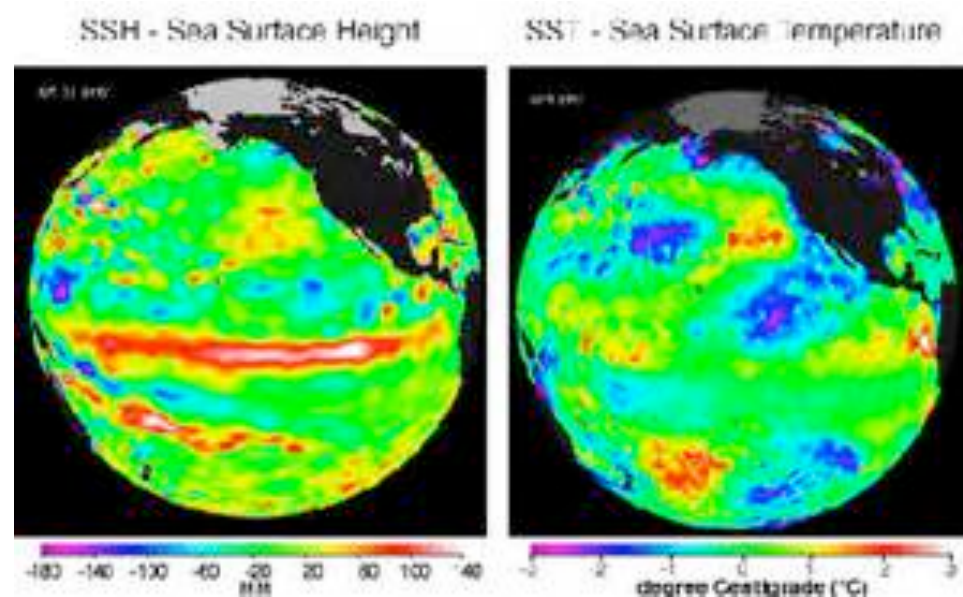




Monitoring Climate Variability



Objective

To discuss i) climate variability associated with ocean-atmosphere interactions, ii) standardized climate indices, and iii) access to climate variability information

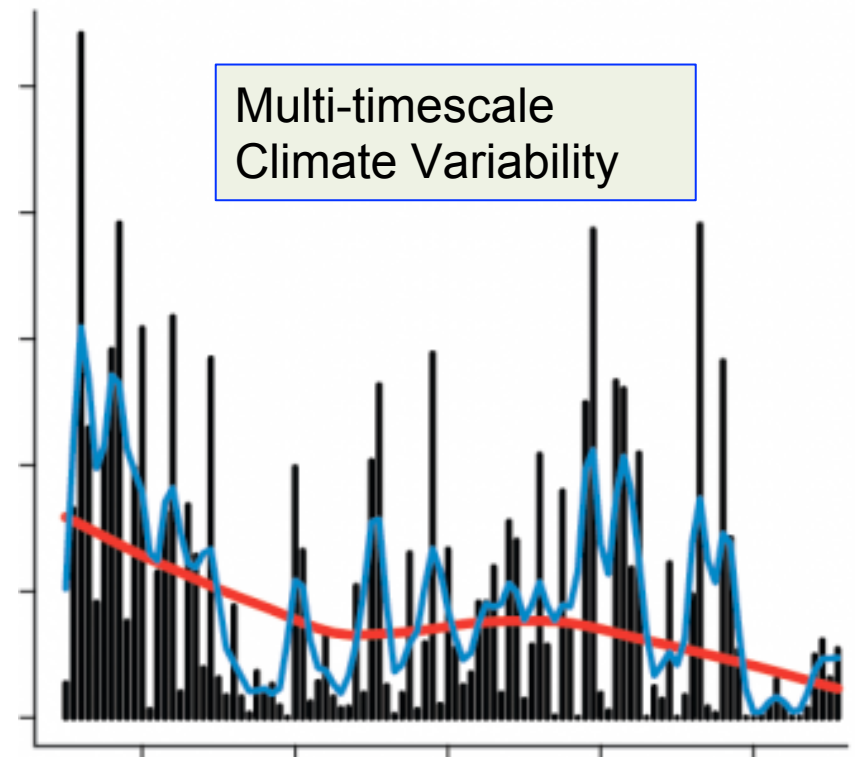
Outline

- Climate Variability
- El Nino and La Nina / Southern Oscillation
- *NOAA Climate Variability Indices and Access (With Live Demo)*
- *International Research Institute (IRI) Climate Data Portal (With Live Demo)*

Climate Variability

Review: Climate Variability

- ❑ Climate is defined as the statistical mean of weather or 'instantaneous' conditions
- ❑ Climate Variability is generally observed as 'large scale spatial patterns' changing with 'low temporal frequency' (*persisting anomalies – or departure from time-mean conditions*)
- ❑ At any location daily weather conditions and weekly to intraseasonal (40-50 days) variations in circulations and hydrologic conditions result due to contributions from:
 - *Climate Change*
 - *Climate variability on various time-scale*



Climate Variability

Climate Variability can be due to any one or a combination of these factors:

- ☐ Sea Surface Temperature Variability
- ☐ Atmospheric Variability
- ☐ Atmosphere Tele-connection

It is important to know the climate conditions (factors above) to understand and predict how they affect regional and local conditions on daily to seasonal time scales

Major Climate Variability Phenomena Affecting South America on inter-annual to Decadal Scales

El Niño – Southern Oscillation (ENSO)

Focus of this
training

Pacific Decadal Oscillation (PDO)

Antarctic Oscillation (AAO)

Tropical Atlantic Sea Surface Temperature

Reference: Past Climate Variability in South America and Surrounding Regions
From the Last Glacial Maximum to the Holocene

Editors: Vimeux, Françoise, Sylvestre, Florence, Khodri, Myriam (Eds.)

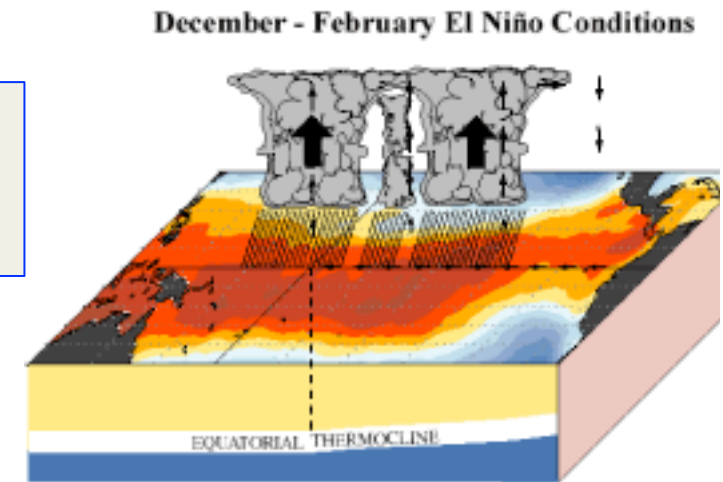
<http://www.springer.com/us/book/9789048126712>

El Niño, La Niña, and Southern Oscillation (ENSO)

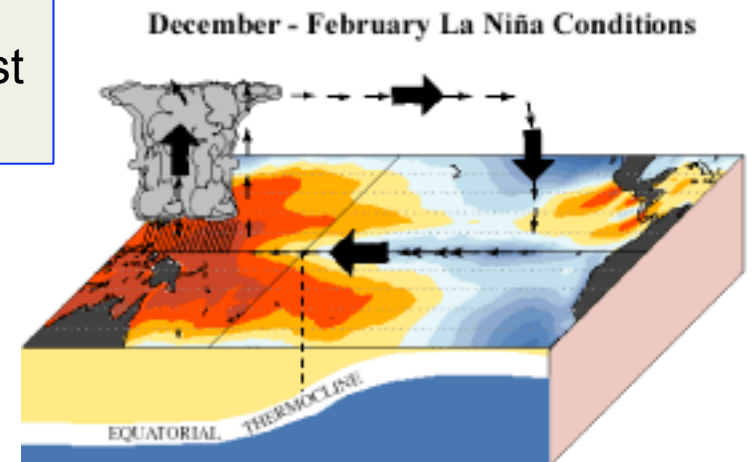
El Niño, La Niña and the Southern Oscillation

- "ENSO" or the El Niño/Southern Oscillation, is the cycle of warming (El Niño) and cooling (La Niña) events that take place **over roughly 2-7 year intervals** over the **equatorial Pacific Ocean and the atmosphere above it**.
- SO: is defined as sea level pressure change between Tahiti and Darwin
- This year-to-year or multi-year variability in oceanic and atmospheric conditions has far-reaching impacts, called "teleconnections", on seasonal precipitation and temperature patterns in many areas of the globe.

Weak east to west circulation



Intensified east to west circulation



NOAA Climate Variability Indices and Access

Climate Variability Indices

NOAA Provides Climate Variability Indices

<http://www.esrl.noaa.gov/psd/data/climateindices/list/>



The screenshot shows the NOAA Earth System Research Laboratory Physical Sciences Division website. The header includes the NOAA logo and the text "U.S. Department of Commerce | National Oceanic & Atmospheric Administration | NOAA Research". The main navigation bar lists "Physical Sciences Division", "About", "Contact", "Research", "Data", "Products", "News", and "Outreach". The left sidebar contains a "CLIMATE INDICES PLOTTING PAGE" link and a "Selected Longer (18xx) timeseries" link. The main content area is titled "Climate Indices: Monthly Atmospheric and Ocean Time Series" and includes a note: "Please reference time series use in publications! Time series that are regularly updated have a * after their name."

Climate conditions are represented by specific indices derived from sea Surface temperature (e.g. El Nino and La Nina), sea level pressure (e.g. Southern Oscillation), and other variables (such as precipitation, momentum)

ENSO Indices

<http://www.esrl.noaa.gov/psd/data/climateindices/list/>

Indices

Niño 3	Eastern Tropical Pacific SSTA (5°N-5°S, 150°W-90°W)
Niño 1+2 90°W-80°W)	<i>Extreme Eastern Tropical Pacific SSTA (0°-10°S,</i>
Niño 4	<i>Central Tropical Pacific SSTA (5°N-5°S) (160°E-150°W)</i>
Niño 3.4 (170°-120°W)	<i>East Central Tropical Pacific SSTA (5°N-5°S)</i>
SOI Difference	<i>Southern Oscillation Index (Sea Level Pressure</i>
	<i>Tahiti-Darwin)</i>

SSTA is Sea Surface Temperature Anomalies (MEI) (Bimonthly Time

NOAA Climate Indices

<http://www.esrl.noaa.gov/psd/data/climateindices/list/>

Climate Indices

NOAA provides:

- Monthly values of the Climate Indices from 1948 to present
- Monthly and seasonal time series plots of user-selected Climate Indices for selected years

Teleconnections:

*PNA | WP | NAO | EP/NP |
EA/WR | NAO (Jones) | NP |
NOI | PDO*

Atmosphere:

*QBO | Global Angular
Momentum | SOI | AAO | AO |
MJO*

Precipitation:

*Indian Monsoon | Sahel | SW
Monsoon | ESPI | Brazil*

ENSO:

*MEI | Nino 1+2 | Nino 3 | Nino
3.4 | Nino 4 | BEST | Tropical
Pacific EOF*

SST:Pacific

*ONI | Nino 1+2 | Nino 3 | Nino
3.4 | Nino 4 | TNI | WHWP |
Pacific Warm Pool | Tropical
Pacific EOF*

SST:Atlantic

*MDR | MDRMTROP | TNA |
TSA | Atlantic Tripole | WHWP
| Atlantic Multi-decadal
Oscillation | Atlantic Meridional
Mode | North Tropical Atlantic
Index (NTA) | Caribbean Index
(CAR)*

Other:

*Global Mean Lan/Ocean
Temperature | Solar Flux |
Trend | Hurricane Activity*

NOAA Climate Indices

<http://www.esrl.noaa.gov/psd/data/climateindices/>

Plotting and Analysis of Monthly Climate Indices

Purpose: Plot, analyze and compare different monthly mean climate time series.

Anomalies are now available. Climatology is entire time period of time series. I am actively working on improvements and additions. Suggestions are welcome.

Selected Longer (18xx) timeseries

Directions and comments

Teleconnections:

PNA | WP | NAO | EP/NP |
EA/WR | NAO (Jones) | NP |
NOI | PDO

Atmosphere:

QBO | Global Angular
Momentum | SOI | AAO | AO |
MJO

Precipitation:

Indian Monsoon | Sahel | SW
Monsoon | ESP | Brazil

ENSO:

MEI | Nino 1+2 | Nino 3 | Nino
3.4 | Nino 4 | BEST | Tropical
Pacific EOF

SST:Pacific

ONI | Nino 1+2 | Nino 3 | Nino
3.4 | Nino 4 | TNI | WHWP |
Pacific Warm Pool | Tropical
Pacific EOF

Time Series 1? PNA (Pacific North American Index) If custom what is filename?

If custom what is time series title?

Time Series 2? None If custom what is filename?

If custom, what is time series title?

Year range? (1948 to present): to

Action?

☒ Plot time series

Optional Set y range: to | Type of Plot: ☒ Line ☐ Boxes

Optional Apply Running Mean to monthly values:: months (use odd number)

☐ Correlate two time series

Lag of 1st time series? Positive lag values indicate 1st time series leads 2nd; negative lag values means 1st lags second.

Correlate using? ☒ All months or seasons in time-series (1 value) ☐ Each months or season calculated separately

☐ Plot autocorrelation function

☐ Plot Cross correlation function

For all actions:

Time Averaging? ☒ Monthly ☐ Seasonal Average First Month of season: Second:

Type of data? ☒ Mean ☐ Anomaly

Live Demo of NOAA Climate Indices Portal

International Research Institute (IRI) Climate Data Portal

Courtesy:

Pietro Ceccato

*The International Research Institute for
Climate and Society*

IRI Climate Map Room

<http://iridl.ldeo.columbia.edu/maproom/index.html?Set-Language=es>




- Access to Current Climate Maps and Forecast: Global and Regional
- Regional Information on Health, Fire, Food Security
- Access to Climate Data Library (More Advanced Training with Programming Required)

IRI Climate Map Room

<http://iridl.ldeo.columbia.edu/maproom/index.html?Set-Language=es>

Available in Multiple languages



IRI/LDEO
Climate Data Library

Data Library

Maproom

Región
Global

Idioma
español

IRI Clima y la Sociedad Maproom

El clima y la sociedad maproom es una colección de mapas y otras figuras que vigilar el clima y las condiciones sociales en la actualidad y en El pasado reciente. Los mapas y las cifras pueden ser manipuladas y están vinculados a los datos originales. Incluso si usted está interesado principalmente en datos en lugar de cifras, este es un buen lugar para ver qué conjuntos de datos son particularmente útiles para vigilar las condiciones actuales.

Climate: Analysis, Monitoring and Forecasts

Historical, current, and future climate conditions around the globe.



Food Security

Climate may affect food security directly or indirectly.



La Federación Internacional de Sociedades de la Cruz Roja y de la Media Luna Roja: Predicciones en Contexto

Esta colección de mapas provee información que puede ser utilizado para tomar decisiones humanitarias a cualquier parte del mundo. Esta colección fue creada por el IRI y la FICR. También provee información de acciones tempranas que puede hacer basada de los mapas.



Climate and Agriculture

The variability of seasonal temperature and precipitation and the sub-seasonal statistics of these and other climate variables play a key role in the quality and quantity of agricultural output. This map room includes maps and analyses of seasonal statistics of historical temperature and precipitation, seasonal temperature and precipitation forecasts, and GCM skill maps for regions of Asia and South America, and a map of farming systems in Africa.



El Niño, La Niña and the Southern Oscillation

This Map Room includes maps and analyses useful for monitoring ENSO, understanding the impacts and learning about key scientific advancements that have led to our current level of knowledge.



Climate and Fire

The Climate and Fire Map Room includes two tools that can support a robust fire early warning system in Indonesia. The Indonesia Rainfall Analysis Tool provides maps and time series of recent rainfall in Indonesia and a fire risk map for Kapuas



Clima y Salud

IRI Climate Data Library

<http://iridl.ldeo.columbia.edu/>

Also Available in Multiple languages

**Biblioteca de Datos Climáticos**

Google™ Custom Search

IRI/LDEO Biblioteca de Datos Climáticos

La Biblioteca de Datos del IRI es un poderoso almacén de datos disponible libremente en línea y una herramienta de análisis que permite visualizar, analizar, y bajar cientos de terabites de datos relacionados al clima, a través de un navegador estándar del internet.

Es una herramienta poderosa que permite lo siguiente libre de costos :

- acceder a una gran cantidad de datos;
- crear análisis de datos desde un promedio básico hasta análisis más avanzados como la descomposición en las Funciones Empíricas Ortogonales al utilizar el Language de Análisis de Datos Ingrid;
- monitorear a las condiciones climáticas actuales a través de mapas y análisis en el [Maproom](#);
- crear representaciones visuales de los datos, incluyendo animaciones;
- bajar datos en diferentes generalizados [formatos](#), incluyendo formatos compatibles con los GIS.

IRI Clima y la Sociedad Maproom

El clima y la sociedad maproom es una colección de mapas y otras figuras que vigilar el clima y las condiciones sociales en la actualidad y en El pasado reciente. Los mapas y las cifras pueden ser manipuladas y están vinculados a los datos originales. Incluso si usted está interesado principalmente en datos en lugar de cifras, este es un buen lugar para ver qué conjuntos de datos son particularmente útiles para vigilar las condiciones actuales.



Datos por Fuentes

Bases de datos organizadas por fuente, i.e. por autor o proveedor.



Datos por Categoría

Base de datos seleccionadas para temas particulares

Navegación por Facetas de las Bases de Datos y Maprooms

Encontrar bases de datos y



Navegación por la Biblioteca de Datos del IRI: Un Tutorial

Este tutorial es una introducción a la estructura de la Biblioteca de Datos y a las diferentes maneras de navegarla.



Técnicas Estadísticas en la Biblioteca de Datos: Un Tutorial

Las técnicas estadísticas son herramientas esenciales para analizar largas bases de datos; así este tutorial estadístico cubre las competencias esenciales para la mayoría de los usuarios de la biblioteca de datos.



Índice de las Funciones

Índice de las funciones disponibles para analizar los datos de la Biblioteca de Datos.



Ayuda y Recursos

La sección Ayuda y Recursos incluye tutoriales básicos y estadísticos, la documentación de las funciones, y otros recursos que permiten explotar la Biblioteca de Datos.

The IRI Data Library is a...

- Data repository
 - >400 datasets covering all aspects of climate-related characteristics
- Data visualization tool
 - Time series, maps, cross-sections
- Data analysis tool
 - Arithmetic operations → EOF analysis
- Data download resource
 - Free access to text, binary, GIS-compatible, etc. data files

[http://
iridl.ldeo.columbia.edu](http://iridl.ldeo.columbia.edu)

Structure of Datasets

Primary Organization

-Dataset

-Dataset

-Variables

-Dataset

-Variables

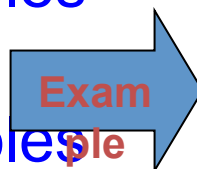
-Dataset

-

Variables

-Primary Organization

.
. .
. .
. .



-NASA

-ERBE (Earth Radiation Budget Experiment)

-Datasets by instrument

-Variables

-GES-DAAC (Distributed Active Archive Center)

-

-GISS

-LeGrande_Schmidt2006 (authors)

-GPCP (Global Precip Climatology Project)

-Datasets by version

-Datasets by instrument

-Variables

.
. .
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IRI/LDEO Climate Data Library

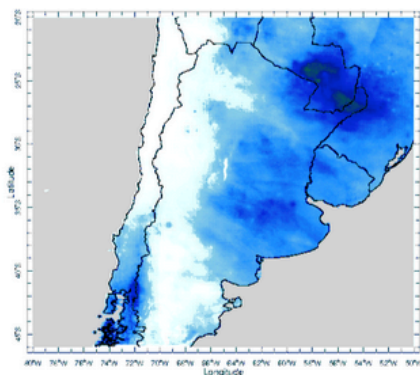
The IRI Data Library is a powerful and freely accessible online data repository and analysis tool that allows a user to view, analyze, and download hundreds of terabytes of climate-related data through a standard web browser.

It is a powerful tool that offers the following capabilities at no cost to the user:

- access any number of datasets;
- create analyses of data ranging from simple averaging to more advanced EOF analyses using the Ingrid Data Analysis Language;
- monitor present climate conditions with maps and analyses in the [Maproom](#);
- create visual representations of data, including animations;
- download data in a variety of commonly-used [formats](#), including GIS-compatible formats.

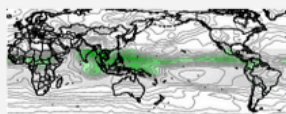
Latest from [What's New](#)

UCSB CHIRPS Version 1.8 Precipitation Analyses



IRI Climate and Society Map Room

The climate and society maproom is a collection of maps and other figures that monitor climate and societal conditions at present and in the recent past. The maps and figures can be manipulated and are linked to the original data. Even if you are primarily interested in data rather than figures, this is a good place to see which datasets are particularly useful for monitoring current conditions.



What's New

Data Library announcements about new datasets and capabilities are available on our tumblr blog



Data by Source

Datasets organized by source, i.e. creator and/or provider.



Data by Category

Selected Datasets for particular topics

Dataset and Map Room Browser

Find datasets and maps organized by many characteristics and keywords



Navigating Through the IRI Data Library: A Tutorial

The goal of this tutorial is to introduce you to the structure of the Data Library and the many ways to navigate through it.



Statistical Techniques in the Data Library: A Tutorial

Statistical techniques are essential tools for analyzing large datasets; this statistics tutorial thus covers essential skills for many data library users.



Function Index

Index for functions that can be used to analyze data within the Data Library.



Help Resources

The Help Resources include basic and statistics tutorials, function documentation, and other resources to help you get the maximum utility out of the Data Library

Customize Links
Customize Links
Free Hotmail
Windows Media
Windows

[MODEL RUNS](#)
[Models](#)
[Morliere](#)
[MPI](#)
[NASA](#)
[NCAR](#)
[NMC](#)


[NMC9195](#)

[NOAA](#)
[OBERHUBER](#)

[OORT](#)

[OSUSFC](#)
[PALEO](#)
[PELTIER](#)
[RC](#)
[REVERDIN](#)

[River](#)
[Sandwell](#)
[SERVAIN](#)
[ShipDrift](#)
[SIO](#)
[SOC](#)
[STEVE](#)
[TAMU](#)
[TRENBERTH](#)



Data Library
Finding Data
Tutorial
Questions & Answers
help@iri

[NASA options](#) [Help](#) [Expert Mode](#)

[SOURCES](#) [NASA](#)

served from [IRI/LDEO Climate Data L...](#)

NASA

NASA: National Aeronautics and Space Administration.

Documents

[overview](#) an outline showing sub-datasets of this dataset

Datasets and variables

ERBE	Earth Radiation Budget Experiment.
GES-DAAC	GSFC Earth Sciences Distributed Active Archive Center.
GISS	NASA GISS[LeGrande_Schmidt2006]
GPCP	Combined satellite-gauge precipitation estimates and error estimates from the Global Precipitation Climatology Project.
GSFC	Goddard Space Flight Center.
ISCCP	International Satellite Cloud Climatology Project.
ISLSCP	International Satellite Land Surface Climatology Project.
Microwave Sounding Unit	Gridded oceanic rainfall data from the Microwave Sounding Unit.
JPL	Not Found

Other Info

iridl:hasSemantics

Done
Done

IRI/LDEO Climate Data Library

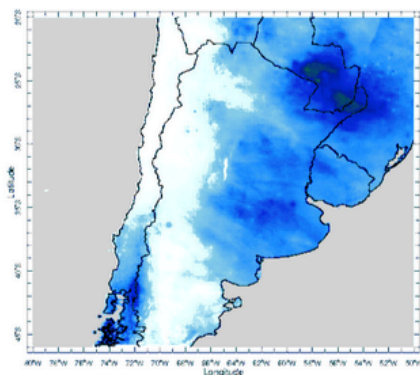
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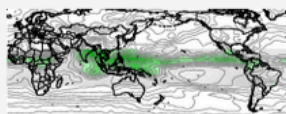
Latest from [What's New](#)

UCSB CHIRPS Version 1.8 Precipitation Analyses



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← → ↻ iridl.ldeo.columbia.edu/docfind/databrief/index.html

IRI/LDEO Climate Data Library Data Library Dataset By Category Language english

Dataset Category

- ☐ Air Sea Interface
- ☐ Climate Indices
- ☐ Cloud Characteristics and Radiation Budget
- ☒ Atmosphere
- ☐ Forecasts
- ☐ Historical Model Simulations
- ☐ Hydrology
- ☐ Ice
- ☐ Oceanography

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IRI

- Air-Sea Interface
- Atmosphere
- Climate Indices
- Cloud Characteristics and Radiation Budget
- Fisheries
- Forecasts
- Historical Model Simulations
- Hydrology
- Ice
- Oceanography
- Topographic and Land Characteristics

Dataset Category

- ☐ Air Sea Interface
- ☒ Climate Indices
- ☐ Cloud Characteristics and Radiation Budget
- ☐ Atmosphere
- ☐ Forecasts
- ☐ Historical Model Simulations
- ☐ Hydrology
- ☐ Ice
- ☐ Oceanography

Share



Dataset Category

- ☒ Climate Indices
- ☐ Atmosphere

IRI Analyses SPI

IRI Analyses SPI: Standardized Precipitation Index analyses of multiple global precipitation datasets.

IRI Analyses WASP

IRI Analyses WASP: Weighted Anomaly of Standardized Precipitation Index analyses of multiple global precipitation data sets.

Indices CPC_Indices NHTI

Northern Hemisphere Teleconnection Indices from Indices CPC_Indices: Northern Hemispheric Teleconnection Indices from the Climate Prediction Center. Time: [Jan 1950,Mar 2015]; monthly

Indices Darwin slp

sea level pressure from Indices Darwin: Sea level pressure data from Darwin, Australia. Time: [Jan 1882,Apr 2015]; monthly

Indices Easter slp

sea level pressure from Indices Easter: Sea level pressure data from Easter Island. Time: [Jan 1951,Dec 1995]; monthly

Indices HANSEN Global

Indices HANSEN Global: Analysis of average global temperature at annual, seasonal, and monthly time scales

Indices Tahiti slp

Indices nino KAPLAN

KAPLAN from Indices nino: Indices representative of the NINO 1 and 2, NINO 3, NINO 3.4, and NINO 4 regions.

Indices nino NCEP

NCEP from Indices nino: Indices representative of the NINO 1 and 2, NINO 3, NINO 3.4, and NINO 4 regions.

Indices nino NCEP_Olv2

NCEP_Olv2 from Indices nino: Indices representative of the NINO 1 and 2, NINO 3, NINO 3.4, and NINO 4 regions.

Indices soi c8110

1981-2010 base period from Indices soi: Southern Oscillation Index.

Indices standardized

Indices standardized: Standardized Southern Oscillation Index. Time: [Jan 1882,Jan 1996]; monthly

NCAR CGD CAS Indices

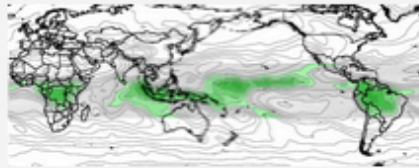
NCAR CGD CAS Indices: Palmer Drought Severity Index from the National Center for Atmospheric Research. Resolution: 2.5x2.5; Longitude: global; Latitude: [58.75S,76.25N]; Time: [Jan 1860,Dec 1995]; monthly

NOAA NCDC CIRS ClimateDivision

NOAA NCDC CIRS ClimateDivision: Time bias corrected temperature, precipitation, and drought index data for United States climate divisions from the National Climatic Data Center.

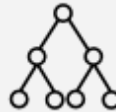
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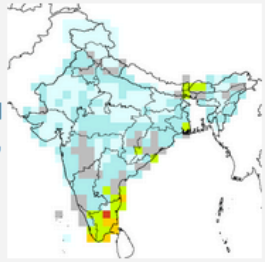
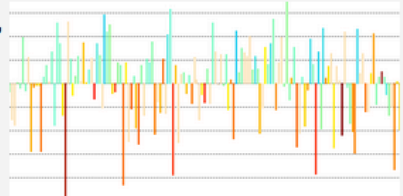
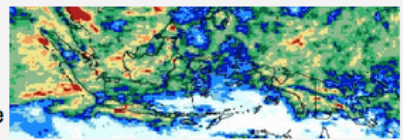


Help Resources

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Options for Map Room Visualization

Analysis <ul style="list-style-type: none"> <input type="checkbox"/> Anomaly (128) <input type="checkbox"/> Climatology (49) <input type="checkbox"/> Column Average (4) <input type="checkbox"/> Difference (9) <input type="checkbox"/> Forecast (57) <input type="checkbox"/> Mean (22) <input type="checkbox"/> Percentile (21) <input type="checkbox"/> Spatial Average (37) <input type="checkbox"/> Standard Deviation (27) <input type="checkbox"/> Standardized (52) <input type="checkbox"/> Variance (8) <input type="checkbox"/> Verification (6) 	<ul style="list-style-type: none"> <input type="checkbox"/> Climate Indices (16) <input type="checkbox"/> Count (20) <input type="checkbox"/> Depth (4) <input type="checkbox"/> Divergence (1) <input type="checkbox"/> Elevation (1) <input type="checkbox"/> Evapotranspiration (1) <input type="checkbox"/> EVI (1) <input type="checkbox"/> Flux (7) <input type="checkbox"/> Geopotential Height (22) <p>14 more</p>	Climate and Agriculture M <p>The variability of seasonal temperature and precipitation and the sub-seasonal statistics of these and other climate variables play a key role in the quality and quantity of agricultural output. This map room includes maps and analyses of seasonal statistics of historical temperature and precipitation, seasonal temperature and precipitation forecasts, and GCM skill maps for regions of Asia and South America, and a map of farming systems in Africa.</p> 
Disease <ul style="list-style-type: none"> <input type="checkbox"/> Malaria (15) <input type="checkbox"/> Meningitis (8) 	Realm <ul style="list-style-type: none"> <input type="checkbox"/> Atmosphere (207) <input type="checkbox"/> Land Surface (9) <input type="checkbox"/> Ocean (12) <input type="checkbox"/> Planetary Surface (58) <input type="checkbox"/> Sea Surface (45) <input type="checkbox"/> Water Surface (45) 	El Niño, La Niña and the Southern Oscillation M <p>This Map Room includes maps and analyses useful for monitoring ENSO, understanding the impacts and learning about key scientific advancements that have led to our current level of knowledge.</p> 
Institution <ul style="list-style-type: none"> <input type="checkbox"/> FAO (1) <input type="checkbox"/> IRI (24) 	Sector <ul style="list-style-type: none"> <input type="checkbox"/> Agriculture (51) <input type="checkbox"/> Climate (295) <input type="checkbox"/> Food Security (7) <input type="checkbox"/> Hazards (28) <input type="checkbox"/> Health (24) 	Climate and Fire M <p>The Climate and Fire Map Room includes two tools that can support a robust fire early warning system in Indonesia. The Indonesia Rainfall Analysis Tool provides maps and time series of recent rainfall in Indonesia and a fire risk map for Kapuas district in Central Kalimantan. The Predictive Tool for Fire Activity offers experimental forecasts of the likelihood of fire activity 1-2 months in advance in Kalimantan, Indonesia.</p> 
Location <ul style="list-style-type: none"> <input type="checkbox"/> Political World (82) <input type="checkbox"/> Global (133) 	Spatial Resolution <ul style="list-style-type: none"> <input type="checkbox"/> Gridded (201) <input type="checkbox"/> Spatial Average (38) <input type="checkbox"/> Station (21) 	Food Security M
Phenomena <ul style="list-style-type: none"> <input type="checkbox"/> Atmospheric Circulation (47) <input type="checkbox"/> Drought (3) <input type="checkbox"/> ENSO (67) <input type="checkbox"/> Precipitation (111) <input type="checkbox"/> Vegetation (4) <input type="checkbox"/> Wind (22) 	Time <ul style="list-style-type: none"> <input type="checkbox"/> Daily (56) <input type="checkbox"/> Dekad (9) 	

Options for Data Download Formats

Example: SST Anomaly

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOlv2 monthly ssta Data Files

This dataset has bytes (1.0342080E08 98.629761MB) of data in it, which should give you a rough idea of the size of any file that you ask for.

Download Data To Specific Software

ingrid	The Postscript-based software on which the Data Library is built.
CPT	Climate Predictability Tool More information
ferret	Interactive computer visualization and analysis software. More information
GrADS	Grid Analysis and Display System More information
matlab	Data analysis and visualization software. More information
NCL	NCAR Command Language More information
WinDisp	A public domain software package for the display and analysis of satellite images, maps and associated databases, with an emphasis on early warning for food security. More information

Other Available File Formats

Full Information Formats These files contain all of the available metadata.	
OPeNDAP	A system which downloads data directly to software, such as matlab, Ferret, GrADS, etc. Specific instructions are available in the table above. Note: OPeNDAP was formerly known as DODS (Distributed Oceanographic Data System). More Information
netCDF (network Common Data Form)	A commonly supported self-describing data format. More Information
Partial Information Formats These files contain only some of the available metadata.	
Columnar Table	A table with separate columns of numbers for each independent variable (i.e., grids) and for the data. This is an inefficient format, so you would have gotten a HUGE file for dataset of this size. This file will be approximately 413683200 bytes, with 4 columns of 25855200 numbers.
2-Dimensional Tab-Separated Tables	Tab-separated-values (tsv) file with information about the independent variables (i.e., grids). The list to the left allows you to specify the format of the table.

**Live Demo of
IRI Climate Data Library
and Map Room**

Next:

Hands-on Activity to

1) Learn to Access Climatology and ENSO
Variability Information using IRI Map
Room